2014

Part I

Answer all questions.

Question: 1

a. Mention one significant difference between each of the following: [5]
i. Implantation and Parturition.

Answer:
Difference between Implantation and Parturition.

Implantation	Parturition
Attachment of blastocyst with the wall of uterus is called implantation	The process of giving birth to child is called parturition

ii. Active absorption and passive absorption.

Answer:
Difference between active absorption and passive absorption.

Active absorption	Passive absorption
It is the process of absorption which occurs at the expense of energy in the form of ATP as it occurs in the presence of roots only.	It is the process of absorption which do not require energy as it occurs even in the absence of roots.

iii. Haemodialysis and Peritoneal dialysis.(**)

iv. Simple fruit and Aggregate fruit.

Answer:
Difference between Simple fruit and Aggregate fruit.

Simple fruit	Aggregate fruit
A simple fruit develops from the single simple or compound ovary of a flower.	An aggregate fruit is a group of simple fruitlets that develop from the free ovaries of a single flower.

v. Auricles and Ventricles.(**)

b. Explain what would happen if: [5]
i. Excess fertilizers are added to soil.

Answer:
Excess fertilizers are added to soil: In this case the soil solution becomes hypertonic and concentration of sap inside the root cells is comparatively less. As a result of which, the contents from root cells moves towards the soil solution. Hence, root cells get plasmolysed.

ii. Blood clots in the coronary artery.(**)

iii. Beta cells in the islets of Langerhans are damaged.(**)

iv. Silicon emulsion is applied over the surface of leaves.

Answer:
Silicon emulsion is applied over the surface of leaves: Silicon emulsion acts as an inhibitor for the presentation of sunlight by masking the exposure area of leaf. If proper amount of sunlight do not enter into leaf, the photosynthesis drastically declines.

v. Magnesium element is deficient in the soil.

Answer:
Magnesium elements is deficient in the soil: Dificiency of magnesium causes marginal curling, interveinal chlorosis with purple anthocyanin pigmentation appearing first in older leaves, veins green, chlorotic areas may turn necrotic, premature leaf abscission, reduced growth, underdeveloped phloem and pith.

c. Each of the following questions/statements have four suggested answer. Rewrite the correct answer in each case: [3]

i. The cell division in the tunica region of shoot apex is:
   A. Periclinal
   B. Horizontal
   C. Anticlinal
   D. Radial

Answer:
Anticlinal.

ii. The dark coloured dead wood present in the central region of old trees is:
   A. Spring wood
   B. Heart Wood
   C. Sap wood
   D. Combium

Answer:
Heart wood.

iii. Dwarfism accompanied with mental retardation is due to hypo-secretion of:(**)
   A. Growth hormone
   B. Thyroxine hormone
   C. Parathormone
   D. Adrenalin hormone

iv. Oxygen is released in photosynthesis by:
   A. Photophosphorylation
   B. Photolysis of water
   C. Photorespiration
   D. Photons

Answer:
Photolysis of water.

v. The spinal nerve is:(**)
   A. A mixed nerve
   B. A sensory nerve
   C. A motor nerve

D. A cranial nerve

vi. The cells of the areolar tissue which produce heparin are:(**)
A. Fibrocytes
B. Mast cells
C. Macrophages
D. Chondricytes

d. Mention the most significant function of the following: [3]

i. Semicircular canals(**)

ii. Bowman's capsule(**)

iii. Parenchyma

Answer:
Parenchyma: The parenchymatous tissue is especially meant for storage of food, slow conduction of various substances and for providing turgidity to softer parts of the plant.

iv. Leg haemoglobin

Answer:
Leg haemoglobin: It acts as an oxygen scavenger, protects the enzyme nitrogenase from oxygen.

v. Guard cells

Answer:
These cells helps in stomatal transpiration and gaseous exchange. The guard cells expand and contract in response to their turgidity and ultimately open or close the stomatal aperture.

vi. Alveoli(**)

e. State the best known contribution of:
i. Munch

Answer:
Munch: Mass Flow or Pressure Flow Hypothesis was put forward by him.

ii. Ronald Ross

Answer:
Ronald Ross: He discovered malaria and established that material parasite is transmitted by the bite of a female Anopheles mosquito.

iii. Marshal Hall

Answer:
Marshal Hall: He contributed in field of Circulatory Physiology, also known as "Father of Modern Neurology".

iv. Huxley

Answer:
Huxley: He made a scientific attempt to the problem of man's origin in his book "Man's Place in Nature". Also suggested that "Birds are glorified reptile".

f. Expand the following:
i. ABA

Answer:
ABA- Abscissic Acid.

ii. FSH

Answer:
FSH- Follicle Stimulating Hormone.

iii. AIDS

Answer:
AIDS- Acquired Immuno Deficiency Syndrome.

iv. DDT

Answer:
DDT- Diethyl Diphenyl Trichloroethane.

Part II

Section A *(Answer any three questions)*

Question: 2

a. Give four difference between root apex and shoot apex.(**) [4]

b. Explain the development of the different types of endosperms in angiosperms [3]

Answer:
Development of the different types of endosperms in angiosperms:
Depending upon the mode of its formation, angiospermic endosperm is of three types:
i. Nuclear Endosperm: The primary endosperm nucleus divides repeatedly without wall formation to produce a large number of free nuclei. Meanwhile central vacuole appears in the central cell and pushes the cytoplasm containing the nuclei to the periphery. The cytoplasm thickness and undergoes cleavage and gives rise to a multicellular tissue e.g., Maize, Wheat, Rice etc.

ii. Cellular Endosperm: Every division of primary endosperm nucleus is followed by cytokinesis. Therefore, endosperm becomes cellular from the very beginning eg. Balsam, Petunia and Datura etc.

iii.Helobial endosperm: The endosperm is of intermediate type between cellular and nuclear types. The first division of primary endosperm nucleus is followed by transverse cytokinesis to from two unequal cells, large micropylar and smaller chalazal cells. Micropylar cells grows faster than the chalazal end eg

Asphodelus.

c. Explain briefly:
i. Capillary Water.

Answer:
It is the water present in soil narrow spaces or micropores of soil having a diameter of 20 pm or below. The amount of capillary water which can be present in a soil depends upon the abundance of micropores. Capillary water is held in the soil by capillary forces. It, therefore, does not fall down to water table by gravity. Only capillary water is available to plant roots for absorption.

ii. Osmosis

Answer:
It is the movement of water from the region of higher chemical potential (found in pure state or dilute solution) to its lower chemical potential (found in solution or stronger solution) without allowing the diffusion of solute by means of a semipermeable membrane is called osmosis.

iii. Aeroponics

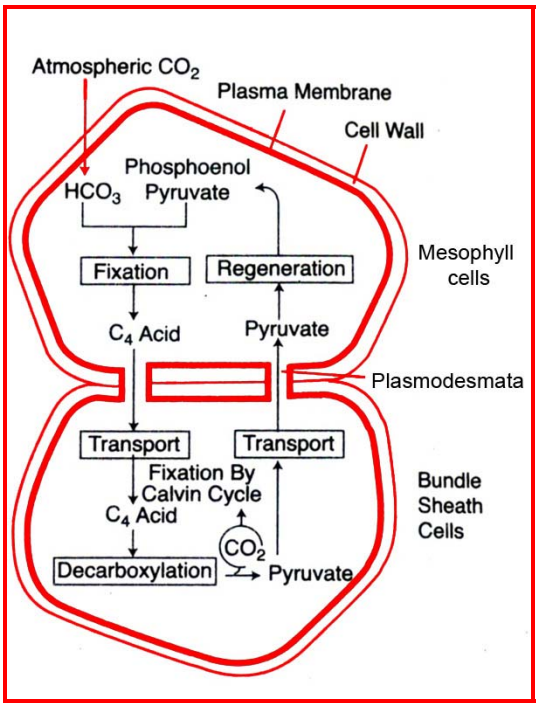
Answer:
Aeroponics: It is the technique of growing plants in above-ground strands provided with the fine mist of normal solution.

Question: 3

a. Explain the C_4 cycle of photosynthesis. [4]

Answer:
It was worked out by Hatch and Slack in number of tropical plants. These plants are called as C_4 plants because of the first stable photosynthetic product being a 4-carbon compound. These plants show Kranz anatomy as mesophyll is undifferentiated and its cells occure in concentric layers around vascular bundles. Vascular bundles are surrounded by large sized bundle sheath cells which are arranged in a wreath-like manner in one to several layers. Mesophyll and bundle sheath are connected by plasmodesmata or cytoplasmic bridges.

Initial Fixation: In C_4 plants, initial fixation of carbon dioxide occurs in mesophyll cells. Primary acceptor of CO_2 is phosphoenol pyruvate or PEP in the presence of enzyme PEP carboxylase or PEP case to from-oxalo-acetic acid or oxaloacetate.



$PEP + CO_2 + H_2O \xrightarrow{\text{PEP Carboxylase}}$ Oxalo-acetic acid (OAA) $+ H_3PO_4$ OAA is reduced to malic acid or transaminated to from aspartic acid. OAA+NADPH $\xrightarrow{\text{Dehydrogenase}}$ Malic acid + $NADP^+$

OAA+Alanine $\xrightarrow{\text{Transaminase}}$ Aspartic acid + Pyruvic acid.

Transport: Malic acid or Aspartic acid is translocated to bundle sheath cells through plasmodesmata. Inside bundle sheath cells they are decarboxylated to from pyruvate and CO_2 Malic acid + $NADP^+$ $\xrightarrow[\text{enzyme}]{\text{Malic}}$ Pyruvic acid $+ CO_2 + NADPH$ Aspartic acid + Pyruvicacid $\xrightarrow{\text{Transaminase}}$ Alanine +Oxaloacetic acid Oxaloacetate $+ H_3PO_4 \xrightarrow{\text{Decarboxylase}}$ PEP + CO_2 + H_2O

CO_2 released in bundle sheath cells is fixed through calvin cycle. RuBP of Calvin cycle is called final or secondary acceptor of CO_2 in C_4 plants.

Regeneration of PEP: Pyruvate and PEP formed in bundle sheath cells are sent back to mesophyll cells. Here pyruvate is changed to phosphoenol pyruvate. Energy is provided in the form of ATP.

Pyruvate $+ ATP + H_3PO_4 \xrightarrow[\text{dikinase}]{\text{Phosphopyruvate}}$ PEP + AMP + PPi

b. State three advantages and three disadvantages of vegetative reproduction. [3]

Answer:

Advantages of Vegetative Reproduction:

i. It is the only method of multiplication in seedless plants e.g., Sugar cane, Banana, Seedless Grape etc.

ii. Plants produced through this method are identical, hence maintain genetic uniformity.

Disadvantages of Vegetative Reproduction:
i. Vegetative propagules get easily decayed and are prove to viral, bacterial and fungal diseases.
ii. There are no variation. Therefore, the plants may show degeneration and in such plants there is a less adaptability to changed environment.

iii. No dispersal of Vegetative propagules. Therefore, it causes over crowding.

c. Mention one role and one deficiency symptom of the following elements in plant nutrition:(**)
i. Phosphorus
ii. Iron
iii. Chlorine

Question: 4.(**)

a. What are tropic hormones? Describe the feedback control of tropic hormones with an example. [4]

b. Explain the conduction of nerve impulse through a nerve fibre. [3]

c. Draw a labeled diagram of the T.S. of bone [3]

Question: 5.

a. Explain the role of pancrease in digestion of various food materials.(**) [4]

b. Briefly describe the stages in clotting of blood.(**) [3]

c. Define: [3]

i. Reparative regeneration(**)

ii. Capacitation

Answer:
Capacitation:Changes in a mammalian sperm which prepares it to fertilize ovum is called capacitation

iii. Menarchy.

Answer:

Menarchy: Initiation or onset of menstruation in girls at the age of puberty i.e., 12-14 years of age.

Question: 6.

a. State four differences between transpiration and guttation. [4]

Answer:

Differences between Transpiration and Guttation

Transpiration	Guttation
1. It is the loss of water by a plant in the form of vapours.	1. Guttation is the loss of liquid droplets from the plant.
2. The transpired water is pure water.	2. Guttated water is a dilute solution of inorganic and organic substances.
3. Transpiration occurs through the generalsurface of the leaves and young stems.	3. Guttation commonly occurs at the margins and the tips of the leaves.
4. It does not leave anything on the surface of the plant.	4. An incrustation of salts is formed on the surface after the guttated liquid evaporates.
5. Most of the transpiration occurs during the hotter periods of the day. It is neigligible during night.	5. Guttation mostly occurs during night and early hours of the morning.
6. Transpiration occurs through stomata, lenticels and epidermal cells.	6. Guttation occurs only through water pores.
7. Stomata can be opened or closed	7. The water pore is always kept open
8. Transpiration causes the development of a negative pressure in the xylem of the plant.	8. Guttation is produced only when the xylem shows a positive pressure.
9. It occurs during dry periods.	9. Guttation takes place during humid periods,
10. Transpiration continues even when the plant is under water stress.	10. It is does not occurs under conditions of water deficiency.
11. Excessive transpiration produces wilting.	11. Excessive guttation does not cause loss of turgidity.

b. Give an account of the secretory phase of menstrual cycle. [3]

Answer:

Secretory phase of Menstural Cycle: This phase usually includes cycle days 15 to 28 in a 28 days cycle. The leutinizing hormone (LH) is secreted by anterior lobe of pituitary gland. LH causes ovulation. Remaining cells of the ovarian follicles are stimulated by the LH to develop corpus luteum. The corpus luteum secretes large amount of progesterone. Progesterine stimulates uterine there is also similar increase in the secretion of watery mucus. During phase, glands and by glands of fallopian tubes, Progesterone is also essential for maintenance of endothelium. Such an endothelium is necessary for implantation of fertilized ovum and other events of pregnancy. In the absence of fertilization, corpus luteum degenerates. This causes disintegration of endothelium leading to menstruation making a new cycle. Thus increase production of progesterone causes secretory phase.

c. Define: [3]

i. Redial vascular bundle

Answer:

Xylem and phloem occur in the form of separate bundles called xylem bundles and phloem bundles. The two types of bundles usually alternate with each other. They occurs on different radii. These are characteristic of roots.

ii. Rigor mortis(**)

iii. Root pressure

Answer:

It is pressure exerted by the cortical cells of the root upon their liquid contents, under fully turgid condition, forcing a quantity of them into the xylem vessels and through them upward into the stem.

Section B

Answer any two questions.

Question: 7

a. Differentiate between apes and man with respect to the following characteristics: [4]
i. Posture
ii. Cranium
iii. Brow ridges
iv. Locomotion

Answer:
Differentiate between apes and man

Ape	Man
i. Posture Less erect posture ii. Cranium: 1. Brain box (cranium) is of small size. 2. Cranial capacity is under 450 cc. iii. Brow ridges Brow ridges are very prominent. iv. Locomotion Locomotion is quadripedal	Fully erect posture 1. Brain box is of large size. 2. Cranial capacity (average) is about 450 cc. Brow ridges are not so prominent Locomotion is bipedal

b. Define: [3]

i. Vestigeal organs

Answer:
The organs which are present in reduced from and do not perform any function in the body but correspond to the fully developed functional organs of related animals are called vestigial organs. They were believed to be remnants of organs which were complete and functional in their ancestors.

ii. Variations

Answer:
ariations: These are morphological, physiological, cytological and behaviouristic differences amongst the individuals of the same species and the offspring of the same parents. They are found in all the characters and in every conceivable direction.

iii. Neo-Darwinism

Answer:
According to it only genetic variations (mutations) are inherited and not all variations as held by Darwin.

c. Give three differences between Natural Selection and Artificial Section. [3]

Answer:

Differences between Natural Selection and Artificial Selection

Artificial Selection	Natural Selection
1. It is an artificial process. 2. It is conducted by man. 3. Traits selected are of human interest 4. Results are achieved in a shorter period	1. It is a natural process. 2. It is conducted by nature. 3. Traits selected are beneficial to the species 4. Results are achieved over a long period of time.

Question: 8

a. State four characteristics of the Cromagnon man. [4]

Answer:

Four characteristics of Cromagnon man:

i. The Cro-magnon man had, like us, about 1.8 metres tall, well built body.

ii. It face was perfectly orthognathous (Jaws do not protrude forward) with an arrow, elevated nose, broad and arched forehead, moderate brow ridges, strong jaws with man like dentition and a well developed chin.

iii. Its cranial capacity was about 1650 cc.

iv. It could walk and run faster and lived in families in caves.

b. Explain the basic postulates of Darwinism [3]

Answer:

The main features of the theory are as follows:

i. Over Production: All organisms possess enormous fertility. They multiply in geometric ratio

ii. Limited food and space: Despite of rapid multiplication of all types of species, food and space and other resources remain limited. They are not liable to increase.

iii. Struggle for Existence: The struggle for existence can be of three types:

a. Intraspecific Struggle: It occurs between the individuals of same species.

b. Interspecific Struggle: It occurs between the members of different species

c. Environmental Struggle: It is the struggle between organisms and the environmental factors.

iv. Variations: The changes which makes two individuals different from each other are called variations. They are gradual and continuous.

v. Natural Selection or Survival of the Fittest: The organism, which are provided with favourable variations would survive because they are fittest to face their surroundings, while unfit are destroyed.

vi. Formation of New species: Variations, if accumulated over generations, becomes so distinct that they from a new species.

c. Archaeopteryx is connecting link between reptiles and birds. Justify the statement by giving two characteristics of each group. [3]

Answer:

It is a connecting link between reptiles and birds due to presence of characters of both groups which are as follows:

i. Reptile characters of Archeopteryx:

1. The body axis is more or less lizards like.
2. A long tail is present and free caudal vertebrae like lizards are found.

ii. Avian characters of Archaeopteryx:

1. Presence of feathers on the body.
2. Jaws are modified into breaks

Question: 9

Person suffering from G6PD deficiency are resistant to malaria. Explain. [4]

Answer:

Glucose 6-Phosphate Dehydrogenase deficiency occurs as an inborn error of metabolism in some persons. It is also called favism because beans cause haemolysis in the patients. Antimalarial drugs like primaquin causes haemolysis in such persons. The haemolysis is due to production of H_2O_2 which is not removed because of Glucose-6PD deficiency and the result is lack of $NADPH_2$. Malaria parasite can not complete schizogony in Glucose 6DP deficiency patient due to immature death of RBCs.

b. Define: [4]

i. Genetic Erosion

Answer:

A permanent reduction in richness or evenness of common localized alleles or loss of combination of alleles over times in a defined area.

This definition recognizes that diversity has two distinct components in:

a. Number of different entities

b. Their relative frequencies.

i. Bioinsectiides: Bioinsectides are those biological agents that are used to control harmful insects. They includes predators, parasites and pathogens and natural insecticides etc.

ii. Antigen: Antigens are substances which, when introduced into the body, stimulate the production of antibodies.

iii. Psychosis: It is the most servere type of mental illness in which the victim forgets everything and remains no longer in touch with the realties of life. Such persons are usually called mad.

c. Define Biofortification. [2]

Answer:

Breeding of crops with higher levels of vitamins and minerals or higher protein and healthier fats is called biofortification. This is the most practical aspect to improve health of people.

Question: 10.

a. List the activities of community Health Services.(**)

b. Give three early diagnostic symptoms of cancer. [3]

Answer:

Three early diagnostic symptoms of cancer:

i. Presence of persistent lump or thickening which can be felt with touch as at the tip of tongue or breast.

ii. Any wound that does not heal.

iii. Any irregular bledding or blood coloured discharge.

c. Define: [3]

i. Carrying capacity

Answer:

Carrying capacity: Total capacity of an environmental for a given population at a given time is called its carrying capacity. It refers to the limit of individuals in an ecosystem at a time.

ii. Implant

Answer:

Implant: It is a tissue or organ inserted surgically into the body to replace a defective part. They are used for replacing joints, arteries, heart valves etc. They are non-toxic and biocompatible.

iii. Carcinoma

Answer:

Carcinoma: Cancer which is mainly derived from epithelial cells. It includes cervical cancer, breast cancer, skin cancer, brain cancer, lung cancer, stomach cancer etc. About 80% of all tumours are carcinomas.